Name: _____ *Date:* _____

Math 10F&PC Chapter 3 Factors and Products

3.7 – Multiplying Polynomials

Focus*: *Extend the strategies for multiplying binomials to multiplying polynomials.

Example 1: Use an area model to determine the product

a) **$(3x + 5)(x^2 + 3x + 4)$**

using distributive pro-

$3x(x^2+3x+4) + 5(x^2+3x+4)$

$3x^3 + 9x^2 + 12x + 5x^2 + 15x + 20$ ⟹ Collect like terms

$= 3x^3 + 14x^2 + 27x + 20$

$(3x-5)(2x+4)$ FoiL

b) **$(3x + 4)(x^2 - 2x - 7)$**

$3x^3 - 6x^2 - 21x + 4x^2 - 8x - 28$ Collect like terms

$= 3x^3 - 2x^2 - 29x - 28$

Use a different strategy to check the products.

Expand and Simplify: *(Polynomials with <u>ONE</u> variable)*

The distributive property can be used to perform any polynomial multiplication. Each term of one polynomial must be multiplied by each term of the other polynomial.

a) **$(3x + 5)(x^2 + 3x + 4)$**

b) **$(3x + 4)(x^2 - 2x - 7)$**

you try

(a) $(2x-3)(4x^2-3x+5)$

$8x^3 - 18x^2 + 19x - 15$ ☺

(b) $(7x+7)(-2x^2+2x-4)$

$-14x^3 - 14x - 28$ ☺

$-14(x^3+x+2)$

Example 2: *Expand and Simplify.*

a) $(3x + 7)^2$

$3^2 = 3 \times 3 = 9$

$(3x+7)(3x+7)$ FOIL

$9x^2 + 21x + 21x + 49$

$= 9x^2 + 42x + 49$

b) $(4k - 3m)^2$

$(4k-3m)(4k-3m)$ FOIL

$16k^2 - 12km - 12km + 9m^2$

$= 16k^2 - 24km + 9m^2$

Example 3: *(Polynomials with more than one variable)*

a) $(2r + 5t)^2$

$(2r+5t)(2r+5t)$

$4r^2 + 20rt + 25t^2$

b) $(3x - 2y)(4x - 3y + 5)$

$12x^2 + 15x - 17xy - 10 + 6y^2$

c) $(3x-4)^3 = (3x-4)(3x-4)(3x-4)$

$(3x-4)(9x^2 - 12x - 12x + 16)$

$(3x-4)(9x^2 - 24x + 16)$

$27x^3 - 72x^2 + 48x - 36x^2 + 96x - 64$ Collect like terms

$27x^3 - 108x^2 + 144x - 64$ that was easy

Example 4: *(Simplifying Sums and Differences of Polynomial Products)*

a) $(2c - 3)(c + 5) + 3(c - 3)(-3c + 1)$

$(2c^2 + 10c - 3c - 15) + 3(-3c^2 + c + 9c - 3)$

$(2c^2 + 7c - 15) + 3(-3c^2 + 10c - 3)$

$2c^2 + 7c - 15 - 9c^2 + 30c - 9$

$\boxed{-7c^2 + 37c - 24}$

b) $(3x + y - 1)(2x - 4) - (3x + 2y)^2$

same as $(2x-4)(3x+y-1) - (3x+2y)(3x+2y)$

1 − 2

$(2x-4)(3x+y-1)$

$6x^2 + 2xy - 2x - 12x - 4y + 4$

(1) $= 6x^2 - 14x + 2xy - 4y + 4$

same as $(6x^2 - 14x + 2xy - 4y + 4) - (9x^2 + 12xy + 4y^2)$

$6x^2 - 14x + 2xy - 4y + 4 - 9x^2 - 12xy - 4y^2$

$= -3x^2 - 14x - 10xy - 4y - 4y^2 + 4$

$(3x + 2y)(3x + 2y)$

$9x^2 + 6xy + 6xy + 4y^2$

(2) $= 9x^2 + 12xy + 4y^2$

Assignment: pg. 186-187 #4c,d, 5d,f, 8d, 9d, 10d, 12, 15b,d,f, 17, 18b, 19b,e, 21b,d